

REVISION OF THE TERMITAPHIDIDAE
(Hemiptera)

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Knowledge of the termitophilous genus *Termitaradus* has been at a standstill since the last of Myers' excellent papers (1932). Myers (1924) first recognized the genus as distinct from the monotypic *Termitaphis* of Colombia and gave a "key to the females of the seven adequately described species." In 1932 he was able to give a redescription of the eighth species, *australensis* (Mjöberg), describe a new species from Jamaica, and describe the eggs of *guianae* (Morrison). Unfortunately a revised key was not given at that time, probably because of the uncertain status of the two Trinidad species, *trinidadensis* and *insularis* described by Morrison in 1924.

The two Trinidad species (both based upon single specimens collected at the same time and place in galleries of the same species of termite) have long been a source of confusion and have occupied isolated positions in Myers' classification; *trinidadensis* because of its small number of abdominal flabella (4 instead of the usual 6 or 8) and *insularis* because of its small number of body lobes (12 instead of 13 or 14 as in all other *Termitaradus* females). However, Myers' work (1924) strongly suggested that the number of body lobes varied between 13 and 14 (both forms were present in his series of *panamensis*) and he even had an incipiently 12-lobed female of *jamaicensis* in 1932. Furthermore, he showed that there were only four marginal flabella to each abdominal lobe in the penultimate nymphal instar of *jamaicensis*.

Through the kindness of Dr. A. M. Adamson of the Imperial College of Tropical Agriculture in Trinidad, I recently received a collection of sixty-nine specimens of *Termitaradus* from Trinidad and Tobago, B. W. I. Specimens were collected by Dr. Adamson at the following localities: Manzanilla, Trinidad, May 24, 1936 (34 specimens); Caura Valley, Trinidad, January 1, 1936 (12 specimens); Mayaro, Trinidad, May 10, 1936 (6 specimens); Caledonia District, Tobago, December 27, 1938 (3 adults and many eggs); and Bacolet, Tobago, September 13, 1938 (14 specimens). This fine collection includes eggs, nymphs of vari-

ous instars, and adult males and females. Dr. Adamson tells me that of the 150 or more species of termites in Trinidad he finds *Termitaradus* only in the galleries of the one species, *Heterotermes tenuis* (Hagen), where they are apparently quite common.

A study of this fine series of specimens sheds considerable light on the limits of variation in *Termitaradus* and settles the status of the doubtful Trinidad species. It now seems obvious that the basic number of lobes on either side of the body is 14 but that 13- and even 12-lobed females occur within the same species. The number of marginal lobules and flabella is very variable on the thoracic lobes but is more constant on the middle lobes of the abdomen and is very constant on the head lobes and on the lobes of the eighth abdominal segment. This last character is so constant and the three-lobule condition occurs so consistently throughout all of the American species in contrast to the two lobules and flabella of the Old World species that one is tempted to reject the record of *mexicana* (2-lobules) as an error in observation. Certainly this is an inconsistency that should be checked when the type or other material is examined.

It seems certain that *trinidadensis* (Morrison, 1923) is the nymph (2 mm. long and 4 marginal flabella on either side of most of the abdominal segments) and *insularis* (Morrison, 1923) is the 12-lobed adult female of a single species. I have nymphs with 4 marginal flabella which are about 1.75 mm. long and, as mentioned above, 12-lobed females are also present in my series. The differences in shape of flabella illustrated by Morrison (1923) fall within the extremes of variation seen in a single individual, though the typical form lies between these two. The name *trinidadensis* is retained with *insularis* as a synonym because it has page precedence, is more appropriate, and corresponds to other geographical specific names in the genus.

The specimens from Trinidad and Tobago have been carefully compared and appear to be identical although the Tobago specimens average slightly smaller. The flabella of the second cephalic lobes are much smaller than those of the other body lobes in *trinidadensis* and one Tobago specimen has these flabella so short that they project beyond the margins of the lobules only at their rounded apices.

Male Termitaphidids are typically 12-lobed, the meso and metathoracic lobes being fused. As pointed out by Myers (1924), they seem to average one more lobule and flabella to each of the

anterior abdominal lobes than in the female of the same species. Males have not been incorporated into the classification because they are known only for *annandalei*, *guianae*, *panamensis*, and *trinidadensis*, they lack the very useful differentiating character of 2 or 3 lobules and flabella on the eighth abdominal lobes, and they differ from the females in average number of flabella on the other abdominal lobes. On the other hand, the flabella are similar in form in both sexes so it is a simple matter to associate the two sexes of a single species. The male genital capsule is very conspicuous, quite fully exposed, and may eventually provide characters for specific differentiation. The basal plates of the aedeagus are completely fused, thus differing from the Aradidae as described by Singh-Pruthi (1925), and the conjunctiva is sclerotized on either side into a plate with a recurved hook. The parameres are long, slender, tapering, and sinuous, being gradually curved near the middle and slightly recurved near the apex.

The eggs are similar to those described by Myers (1932) for *guianae*, being .87 mm. long and .55 mm. across greatest width. This is in spite of the considerably larger size of *trinidadensis* adults. The chorion is very thin, completely transparent, and finely pitted under magnification of 108 diameters. Beneath the chorion is the usual embryonic envelope which is discernible only upon dissection. As noted by Myers, no cap or micropylar processes are developed.

The food habits of the Termitaphididae are still a matter for conjecture but China (1931) called attention to the parallelism in structure of mouthparts (coiled setae) in the Plataspidae, Aradidae, and Termitaphididae and showed that this is a specialization for feeding on the mycelia of fungi. In 1936 I recorded a termitophilous Aradid, *Mezira reducta* Van Duzee, found commonly in the galleries of *Zootermopsis nevadensis* (Hagen). Since Hendee (1933) has shown that fungi are normally found in abundance in the galleries of termites and are rare or absent in sound wood, it seems obvious that the *Mezira* mentioned above and the Termitaphididae in general feed upon fungi associated with termite galleries.

A revised key to the Termitaphididae has been prepared based upon Silvestri's original key (1911) and the subsequent revisions of Morrison (1923) and Myers (1924). One female of *Termitaradus panamensis* Myers and two females of *guianae* (Morrison) were available for study and comparison thanks to

Mr. H. G. Barber, who also examined the types of *trinidensis* and *insularis* in the collection of the United States National Museum and confirmed the critical characters at my request. I might add that the entire problem of the taxonomy of the present material was first referred to Dr. Morrison who turned the matter over to Mr. Barber. Thanks are due to the authorities of the United States National Museum and to both of these men for their cooperation.

SYNOPTIC KEY TO THE TERMITAPHIDIDAE

ADULT FEMALES

- A. Body egg-shaped, surrounded by a strongly incurved and up-curved, dorso-lateral, segmentally divided lamina, the edges of which are further divided into distinct, often quite distantly separated lobules, each with a long, fine almost smooth flagellum. Colombia. (*Amitermes foreli* Wasmann; fam. Termitidae) *Termitaphis circumvallata* Wasmann (1902)
- B. Entire body strongly flattened above and below and surrounded by a flat, lateral, segmentally divided lamina the margin of which is crenulate, forming short, non-separated lobules, each provided with a short, circular, clavate, or lanceolate flabellum with serrate edges. Tropicopolitan. (In association with termites of the family Rhinotermitidae.) *Termitaradus* Myers (1924) (Type: *Termitaradus panamensis* Myers, 1924).
1. Flabella short and rounded, at most scarcely more than twice as long as broad.....2
 - . Flabella elongate, much more than twice as long as broad.....5
 2. Eighth abdominal lobes each with two lobules. Anterior abdominal segments normally with seven or more lobules on each side.....3
 - . Eighth abdominal lobes each with three lobules. Anterior abdominal segments normally with six lobules on each side.....4
 3. Flabella rounded. Anterior abdominal segments with not more than seven lobules on each side. Mexico. (*Heterotermes tenuis* Hagen).....*mexicana* (Silvestri, 1911)
 - . Flabella short, clavate. Anterior abdominal segments with eight or more lobules on each side. India. (*Coptotermes heimi* Wasmann).....*annandalei* (Silvestri, 1921)
 4. Flabella of second cephalic lobe half the size of other head and body flabella, but projecting conspicuously, ovate in form. British Guiana and Colombia. (*Heterotermes crinitus* Emerson and *tenuis* Hagen).....*guianae* (Morrison, 1923)
 - . Flabella of second cephalic lobe much smaller, minute, scarcely surpassing margins, perfectly circular in form. Jamaica. (*Heterotermes convexinotatus* Snyder)..*jamaicensis* Myers, 1932

5. Eighth abdominal lobes each with two lobules.....6
 —. Eighth abdominal lobes each with three lobules.....7
 6. Flabella subcylindrical, rounded at apices or at most very obtusely pointed, echinate. Anterior abdominal lobes each with seven lobules. Africa. (*Rhinotermes putorius* Sjöst.).....
subafra (Silvestri, 1911)
 —. Flabella long, narrow, clavate, with straight sides and squarely truncate tips, not echinate. Anterior abdominal lobes each with eight or more lobules. Australia. (*Copotermes acinaciformis* Froggatt).....
australiensis (Mjöberg, 1914)
 7. Flabella lanceolate, very acute at apices. Panama. (*Heterotermes tenuis* Hagen and *convexinotatus* Snyder).....
panamensis Myers, 1924
 —. Flabella moderately clavate, rounded at apices. Trinidad and Tobago. (*Heterotermes tenuis* Hagen).....
trinidadensis (Morrison, 1923)
 (= *insularis* Morrison, 1923)

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